

Central Bank Digital Currencies:  
The Case For a Digital Dollar  
by  
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## Abstract

This paper aims to describe the current environment surrounding the introduction of central bank digital currencies (CBDCs) and provide a framework for understanding their implications for monetary policy and the effects that these newly born instruments could have on financial intermediaries and on the stability and resilience of the financial system. The paper focuses in particular on the introduction of a digital dollar, concentrating on the possible design structures. It begins with an analysis of existing digital assets that could compete with fiat currencies, viz. stablecoins and cryptocurrencies, and the related risks that could arise if they were to become a widely used means of payment. It explains that stablecoins and cryptocurrencies do not yet represent a sovereignty risk for the US dollar because of their high volatility and the lack of easily accessible structures that enable simple transactions; however, a continuous increase in payment platforms could undermine the stability of financial systems and negatively impact households and businesses. It then analyzes existing projects in regard to CBDCs and their structures, with a stronger focus on the e-CNY, and the cross-border implications of digital currencies on the international role of the US dollar. Finally, it assesses the current stance of the Federal Reserve on the possibility of issuing a digital dollar, the economic and social reasoning behind the issuance, and the future outlook for relevant stakeholders. Concluding with suggestions on the characteristics of the digital dollar and its path to implementation.

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## 1. Overview

The report is structured as follows. Section 2 begins with an analysis of existing digital assets that could compete with fiat currencies, in particular stablecoins and cryptocurrencies, and the related risks that could arise if they were to become a widely used means of payment. It finds that stablecoins and cryptocurrencies do not yet represent a sovereignty risk for the US dollar because of their high volatility and the lack of easily accessible structures that enable simple transactions; however, a continuous increase in payment platforms could undermine the stability of financial systems and negatively impact households and businesses.

Section 3 continues by analyzing existing projects in regard to CBDCs and their structures, with a stronger focus on the e-CNY, and the cross-border implications of digital currencies on the international role of the US dollar.

In Section 4 the main differences between a retail CBDC and a wholesale CBDC are underlined in order to create a framework to design a digital dollar.

In Section 5 the viability of a US CBDC as a tool of monetary policy is conducted by focusing on the effects its implementation could have in times of contractionary and expansionary economic conditions. It concludes that depending on design structures attributed to the currency, a CBDC could provide an innovative solution for the transmission and implementation of monetary policy.

Section 6 analyzes the viability of a US CBDC as a tool to create cross-border payments act at maintaining the international dominance of the US dollar. It finds that increased competition for SWIFT and the rise in alternative cross-border payment pose a risk for the implementation of

foreign and monetary policy and that a CBDC could provide an alternative solution to protect the interests of the US government, households and businesses.

Section 7 focuses on other advantages of CBDC in regards to illicit activities and the traceability of payments.

Section 8 analyzes the risks associated with the introduction of a CBDC. It concludes that an interest bearing CBDC could negatively affect financial institutions and ultimately lead for negative effects for households and businesses. Moreover, the existence of an easily accessible digital currency could aggravate the risk of bank runs and affect the stability of the financial system. Additional risks involving the expectations of privacy of users are outlined.

Section 9 provides a summary of the current stance of the FED thinking regarding the issuance of a CBDC including possible applications and design structures. The analysis of the report shows the interest of the FED in creating a digital currency aimed at solving the issue of financial inclusion and allow for better implementation of monetary policy. The CBDC will have to offer a resilient digital asset to cyberattacks and operational efficiency. Currently, there active pilots for a US CBDC but the FED is conducting several research projects aimed at understanding optimal design structures and implementation. The report aims at providing a useful framework to start a conversation with meaningful stakeholders.

## **2. Current Environment**

In this section, we analyze the current financial environment and important trends among existing alternatives to fiat currencies that have been emerging in the past couple of years. We begin by focusing on the rise of private peer-to-peer (P2P) payment systems and the risks that an increase in transaction value and consolidation by a limited number of providers could have on

households and businesses, finding that the rise of P2P transactions in the US might ultimately lead to a decrease in the resilience of the financial system. A CBDC would provide a tool to alleviate counterparty risk, avoid systemic runs and promote innovation. We continue by analyzing the risks posed by the growth of stablecoins by evaluating their volatility and resilience in moments of economic shock, finding that the current the lack of regulation surrounding these instruments, as well as their speculative nature, can negatively affect households and businesses and pose moderate risks for the financial system. Nevertheless, their complex implementation as a medium of exchange and their high volatility rates continue to make these digital assets a noncomparable alternative to any fiat currency in developed economies. A monetary sovereignty risk might arise as these instruments become integrated in everyday transactions. A CBDC would provide a safe alternative digital asset for conducting business in an innovative and secure way.

### *2.a Growth of private payment systems*

In recent years the growth of private payment systems, increase in nonbank deposits, and rise in digital wallets transactions has raised concerns for central banks and regulators. In particular, the value of P2P mobile payment transactions in the US is expected to reach \$984 billion by the end of 2022, a 25.3% increase over the previous year (Broadbent 2022). Fig. 1 shows past and expected growth of US mobile P2P transaction values and number of users.

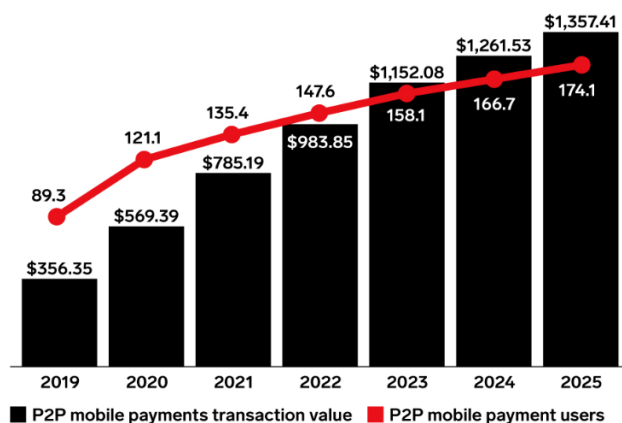


Fig. 1. US mobile peer-to-peer (P2P) payment transaction value and users, 2019–2025 (billions and millions of users). Source: eMarketer

The total transaction value is expected to account for about 30% of all credit card payments by 2026, with leading companies such as Venmo, PayPal, and Zelle dominating the industry. Consolidation by a limited number of competitors into a privately managed payment system could pose risks for the resilience of the payments system; as cash disappears, fewer households are able to save or pay with risk-free central bank currency. In this scenario, the central bank could find its role diminished to that of a wholesale retailer to financial institutions, while its presence in terms of retail transactions between businesses and consumers would become marginalized. At the same time, doubts about the financial viability of individual payment system providers might cause consumers to quickly abandon one or more platforms in fear of a future lack in accessibility to their funds, with analogous runs spreading to other solvent providers. With the expected increase in transaction size, the risks posed to the stability of the financial system can become extremely large and be exacerbated by the counterparty risk affecting providers. The issuance of a US CBDC could guarantee the existence of a risk-free alternative to cash backed by the central bank that can be connected to the aforementioned



payment systems while maintaining the necessary safeguards to protect users and decrease the risks of transmissibility of monetary policy.

Additionally, these payments are subject to technological risk, and there have been an increasing number of cyberattacks aimed at obtaining access to consumers' accounts and data.

Fig. 2 shows the industries that received the most cyberattacks in 2020, with financial services and insurance accounting for almost one quarter of all of them.

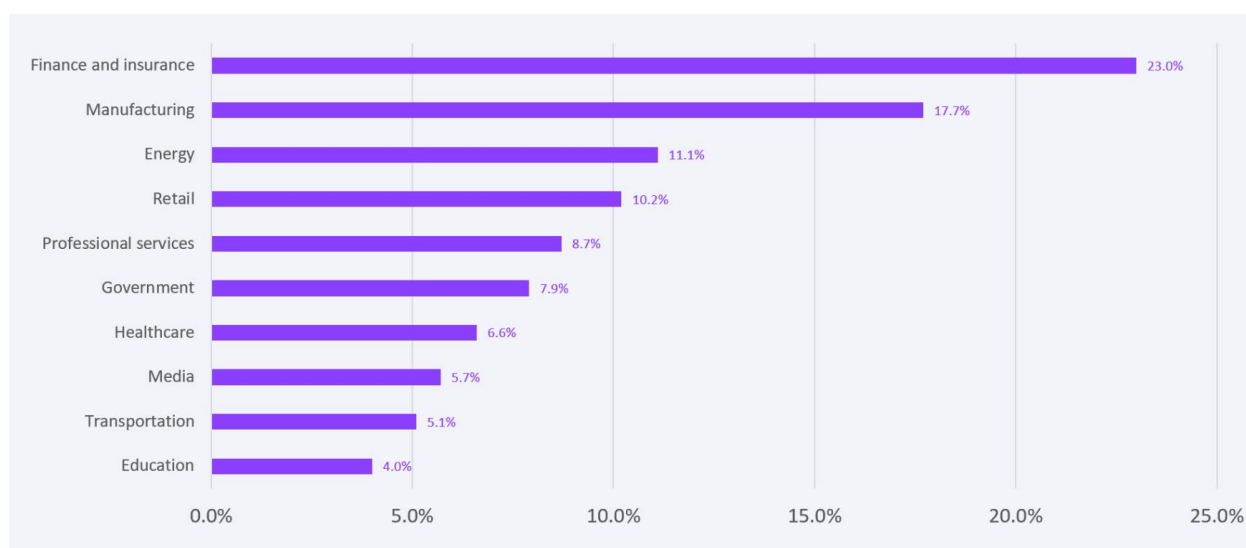


Fig. 2. Share of cyberattacks on the top 10 industries. Top attacked industries in 2020, shown as a percentage of attacks on the top 10 industries. Source: IBM Security X-Force.

The creation of separate infrastructure to enable private agents to operate using CBDCs could allow for a dynamic market with both suppliers of payment services and consumers using a network managed, protected, and guaranteed by the central bank.

### *2.b Stablecoins and Monetary Sovereignty*

In recent years, the digital transformation of the payment system has given rise to a large number of digital assets, often referred to as stablecoins, that aim to minimize fluctuations in

price by having their value backed against a basket of currencies or physical and financial assets. Most providers of stablecoins have pledged full redeemability of these digital assets for fiat currency, although such issuers usually lack the regulation and safeguards of bank deposits, which are protected by strict capital requirements, deposit insurance, and regulatory oversight, making the assets susceptible to runs.

In the case of floating stablecoins, runs could start when users anticipate a fall in the value of the underlying asset, causing a decrease in redemption value and losses for consumers. Moreover, a run can be prompted even in the case of a guaranteed fixed redemption price if users anticipate the incapability of the provider to absorb the losses and decrease in capital. This could cause a widespread liquidation of assets aimed at backing the stablecoin that can spread throughout the whole financial system, affecting several asset classes at the same time. Some safeguards could be implemented to decrease these risks, such as by asking issuers to deposit their assets at the central bank in order to reduce counterparty risk and strengthen redemption commitments. However, these attempts at risk reduction could further increase the role played by the private instruments at the expense of sovereign public money and the important role it plays in monetary policy and the trust and safety it aims to guarantee to citizens.

At the same time, an increase in the viability of stablecoins would likely foster large investments in safe assets from the issuers to guarantee the value of these instruments. The decrease in viability of these safe assets could influence interest rates and their volatility, thereby having an undesirable effect on the implementation of monetary policy. A shift from bank deposits to stablecoins would increase funding costs for these financial institutions, ultimately leading to negative effects on households and businesses and undermining the efficacy of the current systems of monetary policy transmission.

Meanwhile, the risks remain low but there is a requirement for an increase in monitoring and regulation. In the current environment, there is no real threat of stablecoins (or even cryptocurrencies) becoming a suitable alternative to the US dollar. In particular, a good currency needs to be a good store of value, good unit of account, and good medium of exchange. At the moment, stablecoins and cryptocurrencies lack all three of these elements.

Fig. 4 and Table 1 show the realized volatilities of the largest cryptocurrency in circulation and the major stablecoins backed by the US dollar or US dollar-denominated financial assets, namely Tether, Binance USD, and USD Coin. These values were computed following Grobys and using the following formula:

$$\sigma_{i,t} = \sqrt{T} \sqrt{\left( \ln\left(\frac{HIGH_{i,t}}{CLOSE_{i,t}}\right) \cdot \ln\left(\frac{HIGH_{i,t}}{OPEN_{i,t}}\right) + \ln\left(\frac{LOW_{i,t}}{CLOSE_{i,t}}\right) \cdot \ln\left(\frac{LOW_{i,t}}{OPEN_{i,t}}\right) \right)},$$

where  $HIGH_{i,t}$ ,  $LOW_{i,t}$ ,  $OPEN_{i,t}$ , and  $CLOSE_{i,t}$  denote the highest, lowest, opening, and closing price for cryptocurrency  $i$  on day  $t$ , respectively,  $\sigma_{i,t}$  denotes cryptocurrency  $i$ 's corresponding realized annualized volatility, and  $T = 365$  refers to cryptocurrencies traded 24/7 (Grobys).

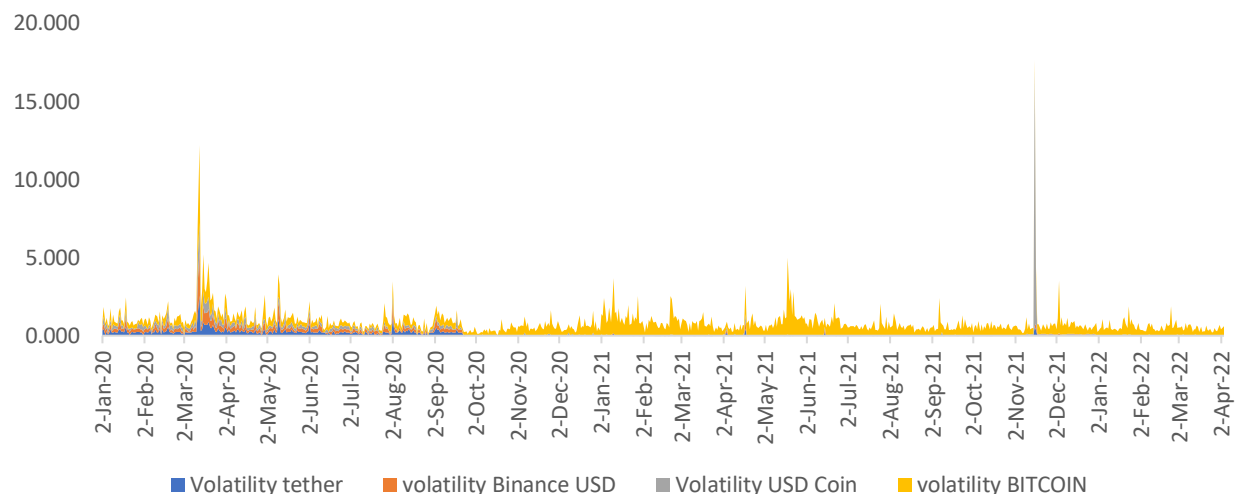


Fig. 3. Daily volatility of stablecoins and bitcoin. Source: CoinmarketCap.com

**Table 1**

Realized Volatilities of Major Stablecoins Backed by the US Dollar or US Dollar–Denominated Financial Assets and Bitcoin

|                                 | <b>Bitcoin</b> | <b>Binance</b> | <b>USD Coin</b> | <b>Tether</b> |
|---------------------------------|----------------|----------------|-----------------|---------------|
| <b>Max</b>                      | 4.9856         | 2.8150         | 16.3236         | 2.5798        |
| <b>Mean</b>                     | 0.5976         | 0.1016         | 0.1141          | 0.0910        |
| <b>Std. Dev.</b>                | 0.4847         | 0.1932         | 0.6293          | 0.1754        |
| <b>Skewness</b>                 | 3.6746         | 6.1371         | 23.6210         | 5.3418        |
| <b>Kurtosis</b>                 | 22.4477        | 66.1557        | 604.1467        | 55.4963       |
| <b>Correlation with Bitcoin</b> | 1              | 0.1919         | -0.0145         | 0.1616        |
| <b>Observations</b>             | 824            | 824            | 824             | 824           |

Adapted from Grobys.

As we can see, average daily volatility for all the major stablecoins remains high at around 10%, but it is at significantly lower levels when compared to Bitcoin. Moreover, maximum volatilities remain extremely high for both cryptocurrencies and stablecoins. Skewness also offers interesting information in regard to the volatility of these assets; in fact, investors should expect frequent lower volatility levels, but these assets can be susceptible to infrequent but very large swings during times of economic turmoil or pressure on the cryptocurrency market. Additionally, two of the major cryptocurrencies currently in circulation, Binance USD and Tether, show significant positive correlations with Bitcoin, making these assets susceptible to price changes that are not only related to changes in demand for the dollar but also for the crypto market in general.

With regard to stablecoins' use as a medium of exchange, they are currently used as a tool to facilitate trading, lending, and borrowing of other digital assets and are not widely used for everyday retail transactions. However, some projects aimed at this implementation exist, but their success will depend on transaction costs (currently high compared to traditional alternatives), user's confidence in the issuers, and ease of access to digital wallets.

### **3. Existing Attempts at CBDCs**

In recent years, an increasing number of central banks have been focusing on the possibility of issuing CBDCs. This may be done for several different reasons, ranging from financial inclusion to their hope of increasing the international presence of their currency as a means of cross-border payments. There are now nine fully operating CBDCs, and fifteen more countries have officially launched pilot programs. This section aims to provide interesting insights on both successful and unsuccessful attempts to introduce payment systems and digital currencies managed by central banks and focuses on illustrating the differences in design and

ambition between relevant projects carried out in the Bahamas, Uruguay, Ecuador, and China. This will help provide a better understanding of how the digital dollar should be structured in order to develop a competitive alternative to domestic fiat currency and foreign digital currency. Fig.4 below summarizes the key design structures of the CBDCs attempts analyzed in the section.

| <b>Sand Dollar</b><br>(The Bahamas)  | <b>e-peso</b><br>(Uruguay)   | <b>Dinero Electronico</b><br>(Ecuador)   | <b>e-CNY</b><br>(China)  |
|--|--|--|--|
| <ul style="list-style-type: none"> <li>• Account-based CBDC</li> <li>• Non-interest bearing</li> <li>• Limited deposits</li> <li>• Intermediated</li> <li>• Officially launched in 2021</li> </ul> | <ul style="list-style-type: none"> <li>• Value-based CBDC</li> <li>• Accessible on mobile e-wallets</li> <li>• Currently in development</li> </ul> | <ul style="list-style-type: none"> <li>• Value-based</li> <li>• Accessible on mobile e-wallets</li> <li>• Project withdrawn in 2017</li> </ul> | <ul style="list-style-type: none"> <li>• Account-based CBDC</li> <li>• Non-interest bearing</li> <li>• Limited deposits</li> <li>• Intermediated</li> <li>• Infrastructure can allow cross-border payments</li> <li>• Officially launched in 2021</li> </ul> |

Fig. 4. Design and structure of CBDCs issued by The Bahamas, Uruguay, Ecuador and China.

### *3.a The Bahamas: Sand Dollars*

At the beginning of 2020, the Bahamas exited the pilot phase of its digital Bahamian dollar project and introduced the new digital currency, the Sand Dollar, to the public. The reasoning behind this was laid out by regulators under the flag of financial inclusion. Many

citizens of the Bahamas are dispersed across remote island and may lack access to any banking services.

The Sand Dollar marks an extremely important stage in the development of CBDCs, as it represents the first account-based digital currency to be issued by a central bank. The Central Bank of the Bahamas has worked towards granting anonymity and discretion to its users, but it also acknowledges that, by design, the currency will not guarantee the anonymity that cash maintains. Both business and citizens will be able to create accounts at the central bank and use the Sand Dollar domestically and potentially to exchange it for foreign currency. Moreover, citizens who lack bank accounts will be able to use digital wallets to perform basic operations in the country.

To avoid large outflows of capital from financial institutions that could destabilize the Bahamian financial system and prompt bank runs, the central bank has instituted limits on the amounts that can be deposited into each account, which in turn must be linked to a local bank in order to divert possible amounts that exceed such limits. The central bank has also opted to make the currency noninterest-bearing in order to counteract further adoption risks.

### *3.b Uruguay: e-Peso*

In 2017, the Uruguayan government initiated a pilot program to create a digital version of its peso, the denominated e-peso. The currency was devised as a complement to cash currency, and the program provided a controlled environment to test for its introduction in the country. The e-peso was structured as a value-based CBDC. Members of the pilot program could easily download the e-peso app, and through it they could transfer physical currency to the e-peso from accredited financial institutions.

The new currency provided a very useful instrument for increasing financial inclusion and safety. In fact, e-peso wallets only required a phone line linked to a protected account that could be retrieved even if the device is lost. This successfully provided users with a safer alternative to cash for storing money and quickly settling transactions. The pilot ended after a total issuance of about twenty million pesos (approximately \$700,000) and received positive feedback from both merchants and consumers. The Uruguayan government has since withdrawn the e-pesos, but it has stated that it will continue to work on the project.

### *3.c Ecuador: Dinero Electrónico*

Ecuador adopted the US dollar as its main currency in 2000 in response to the hyperinflation that afflicted the sucre and contributed to substantial recession and destabilization in the country. During the years of hyperinflation caused by reckless money printing by the Banco Central del Ecuador, Ecuadorian citizens were already switching to the much safer US dollar for saving and conducting everyday transactions. The currency became accepted by most enterprises operating in the country, thereby prompting the central bank to accept US Dollars as legal tender.

However, Ecuador's lack of financial inclusion, with over 40% of its citizens lacking access to bank accounts, remained a significant issue that needed to be addressed. At the same time, mobile phone access was very high throughout the country, and this combination of exclusion and device usage prompted the government to create an electronic payment system (Sistema de Dinero Electrónico) that would allow any user to create an account and deposit money through a specifically designed app to make payments.



The project appeared to be a means for the government to decrease reliance on the US dollar, but lack of trust in governance and the system ultimately prompted its demise, showing how the introduction of any form of CBDC might fail if transparency and trust were to be lacking on both sides.

### *3.d China: Digital Renminbi*

China was among the first major economies to focus on the creation of a digital fiat currency, and its first attempt to look into the advantages and disadvantages of this approach traces back to 2014. In 2017, China officially embarked on the project and created the first research testing environment for the use of a CBDC as a digital payment system. By the end of that year, a partnership had been created with commercial institutions to begin the first testing programs in designated areas. In July 2021, the People's Bank of China (PBOC) released its first official white paper for the digital renminbi (e-CNY).

Among the main objectives for the creation of the currency, as cited by the PBOC, was for mitigation of the risks related to the increase in usage of private digital payments and mobile payments and the high cost of cash management for businesses. The PBOC also highlighted the high risks that increased reliance on cryptocurrencies could pose for the stability of the financial system and to social stability, given the high volatility of these instruments and their anonymous nature that enabled the financing of illegal activities in the country.

The e-CNY holds all the basic functions of fiat currency and the status of legal tender. The PBOC issues the e-CNY and distributes it to commercial banks, which have been given the task of exchanging it and distributing it to the public. The new currency is designed to be a complement to cash and does not aim to completely substitute the renminbi, since the PBOC

acknowledges the advantages that physical currency holds in such a large and diverse economy. Since the e-CNY represents a substitute to M0, it is noninterest-bearing. At the same time, to promote the stability of the financial system and avoid bank runs, the PBOC has opted for a tiered design of e-CNY wallets with different caps on transactions and balances.

The existing infrastructure will allow trusted organizations to participate in the future in the payment system, in turn fostering China's digital economy and financial inclusion through the use of mobile wallets that will help unbanked citizens to enjoy basic financial services.

According to the PBOC, the e-CNY represents an efficient solution to cross-border payments, and China hopes that increased international demand for the currency will translate into partnerships with other central banks to develop exchange arrangements for cross-border payment systems that would serve to increase the international presence of the Renminbi.

#### **4. Designing a Digital Dollar**

This section aims to identify the main stakeholders and different design structures for a digital currency. The main advantages and disadvantages of each design structure are identified in order to create a framework for a final recommendation on how to design a US-based CBDC.

##### *4.a Defining stakeholders*

A major question regarding the introduction of CBDCs surrounds the stakeholders that their introduction aims to address. In particular, central banks face two main scenarios depending on the liability that they want their digital currency to emulate. In the first case, central banks can decide to opt for a systemically softer introduction with digital currencies emulating wholesale reserves. This approach would neither pose a major threat to the financial system nor cause any disintermediation, and it would only affect existing account holders at central banks and

participants in real-time gross settlement payment systems comprised of large clearing parties and banking institutions. The strong advantage of this strategy for central banks would be that it represents an easier testing environment with a limited number of users and amount of interaction, and it would likely be the most feasible option for the early stages of such instruments.

The second scenario for central banks would be to develop a digital currency to substitute retail cash by creating a widely accessible fiat currency that could potentially be used in everyday transactions. A retail CBDC would grant central banks the ability to directly interact with citizens and to adopt new monetary policies in a much more immediate and direct way. There are two options available for central banks to issue retail CBDCs. The first option is to issue CBDCs directly, with the central bank actively administering its circulation. The second is to use a so-called “synthetic” CBDC that is issued by commercial banks with the backing of central bank liabilities.

#### *4.b Retail CBDC*

A retail-based CBDC could take on two different designs: a value-based CBDC, which would be locally storable on digital devices or cards to allow the new currency to be used as a quick substitute for cash or an account-based CBDC, or a register-based CBDC, with the central bank being the manager of the payment system and potentially using it to better manage monetary policy.

A value-based CBDC would take an e-money approach that would require the involvement of financial institutions to distribute the new currency to digital wallets stored on prepaid cards or phones and other electronic devices. E-money would therefore emulate what is

currently being performed by digital payments systems such as Venmo, PayPal, or those of financial institutions, albeit with the central bank monitoring the payment system.

The account-based approach would aim to create a system whereby citizens and business are able to hold accounts directly at the central bank, which could then manage the money in the deposits to implement policies in a faster and more efficient way. Central banks would have to develop a centralized mechanism to manage the accounts and payments and could rely on a permissioned blockchain or distributed digital ledger system to manage transactions.

#### *4.c Wholesale CBDC*

A wholesale CBDC could help central banks to better manage reserves held by financial institutions and facilitate the clearing and settlement of payments between these institutions. Currently, large transactions are settled through real-time gross settlement systems, while smaller ones are settled at the end of the day on a net basis, given their size and volume. The introduction of a wholesale CBDC for the Federal Reserve would not bring substantial advantages, even though the use of a distributed digital ledger could provide some benefits, but it could help create an important testing ground for infrastructure that would eventually support other forms of CBDC. The creation and implementation of wholesale CBDCs is currently being studied by large central banks, including the Bank of Canada and the Monetary Authority of Singapore, with a focus on developing a distributed digital ledger and blockchain platforms to settle interbank payments.

### **5. Digital Dollar and Monetary Policy**

This section aims to identify the viability of a US CBDC as a tool for the implementation of monetary policy. It starts by providing an general understanding of the current tools available

to the Federal Reserve and of their effectiveness. The effectiveness of CBDCs as a tool of monetary policy implementation is analyzed both during times of economic turmoil and of economic expansion to provide a working framework and establish final design structures.

#### *4.a Current Economic Environment*

Following the Great Recession and the COVID-19 pandemic, central banks around the world have started reevaluating the effectiveness of their existing tools for implementing monetary policy and focused on the creation of alternative solutions to act swiftly to rapid changes in the economy. In particular, this has prompted central banks to integrate two new major tools, forward guidance and quantitative easing, to increase downward pressure on both mortgage rates affecting households and corporate bond rates affecting businesses. While these tools have been successful, their sustainability in the current rates environment, and with the large-balance sheet now held by central banks, might require policymakers to focus on implementing other innovative tools.

With interest rates near zero and rising inflation, forward guidance may no longer represent a successful tool to curb these pressures and incentivize consumers to save. In this environment, central banks have started to focus more on long-term interest rates compared to short-term ones, as they better relate to inflation and growth. Long-term interest rates also provide a market expectation of what a central bank will do in regard to short-term interest rates, and if it will be able to deliver on its goals. Even if short-term rates remain low, a central bank that shows unwillingness to take the necessary measures to counteract inflation will be subject to rising nominal interest rates, which in turn can heavily hurt borrowers.

Conversely, in times of recession, central banks have begun to focus on quantitative easing, a form of unconventional monetary policy whereby they buy long-term government bonds in order to directly influence their price and therefore lower long-term interest to boost lending and investment. This flattens the yield curve by diminishing the difference between short-term and long-term interest rates. This has caused the Federal Reserve balance sheet to expand from about 7% of GDP in 2007 to about 20% in 2020, raising concerns about the viability of its reduction to previous levels in times of economic expansion.

In difficult times, central banks can be propelled into pushing real interest rates as close as possible to the effective lower bound, sometimes even into negative territory, to foster consumer borrowing and spending. However, financial intermediaries, and in particular banks, might not be willing to lend at those terms in times of recession, during which the chances of default are greater. Therefore, this might completely undermine the effectiveness of a central bank in effectively providing capital to consumers and to foster growth in the economy.

#### *4.b CBDC as a Tool to Push the Zero Lower Bound*

Cash is not an optimal tool for saving in normal times, as inflation takes away part of its value over time. However, in times of extremely low inflation, or even negative inflation, and when alternative investments with the same risk profile, such as long-term government bonds, offer a negative nominal return, then cash becomes the best alternative for saving.

An account-based CBDC in a society in which cash is almost non-existent would allow the central bank to better react to a severe financial crisis, such as the 2009 financial recession or the 2020 COVID crisis, by allowing it to implement negative nominal interest rates on its balances, thereby providing the central bank with a new and powerful tool to incentivize

borrowing and spending during times of deflation and negative interest rates. This would also allow commercial banks to offer negative rates on their deposits, as they would no longer fear a loss in capital caused by a switch to cash from consumers. However, this should not be the major case for pushing for the introduction of a retail CBDC; in fact, most central banks expect CBDCs to coexist with cash, at least in the short and medium term.

An additional drawback for the implementation of this strategy comes from the effectiveness of negative interest rates and their ethical implications. In fact, even if CBDCs were able to successfully allow central banks to push interest rates into negative territory, it is most likely that the major negative repercussions would be experienced by pension and mutual funds, which tend to invest in long-term safe securities and passively manage their investments, thereby hurting an already fragile aspect of society.

#### *4.c CBDCs as a Tool to Fight Inflation*

CBDCs could also provide a useful tool for central banks in economies that are experiencing rapid growth and high inflation. For many decades, high inflation has been the main concern for central banks all around the world, and the extent to which they have managed to control it has often primarily depended on how successfully they convinced consumers and businesses that everything possible would be done to control the inflation (rewrite).

If inflation expectations are mismanaged, and consumers expect future prices to be higher, those consumers would demand higher wages from their employers, which in return would increase the cost of goods or services, ultimately boosting inflation. Therefore, the more tools that central banks have available to control these expectations, the more faith there will be in them meeting their objectives.

In this environment, CBDCs could be used to effectively offer higher interest rates to consumers and businesses, compared to commercial banks, in order to incentivize saving instead of spending and investing. This would further decrease inflationary pressures, as financial intermediaries would be deprived of the funds necessary for lending to private businesses and consumers.

#### *4.d Helicopter Money and Stimulus*

Following the recent COVID-19 pandemic and the economic crisis that has followed, governments and central banks have started to consider increasing cash holdings for families and individuals by distributing fixed amounts of money to grant disposable income in times of high unemployment and uncertainty. This unconventional and quite new form of intervention is often called *helicopter money drops*, and since this approach often escapes the purview of central banks, it has often led to an increase in purchases of long-term government bonds by central banks that in turn can be used by the government to finance such programs. However, this process has been shown to have some downsides, as government channeling might impede the optimal distribution of money or lack the reactivity necessary to avoid deflation and large recessions.

CBDCs could provide an easy way of implementing helicopter money drops and successfully distribute them if citizens were to hold accounts, or wallets, directly at a central bank. This would allow for the process to be extremely fast and reliable and could help avoid negative effects on the economy during times when financial institutions might be reluctant to grant credit and spending might be in heavy decline (e.g., COVID-19 pandemic).



In 2020, the US government enacted a stimulus program to provide economic relief to citizens during the pandemic. It aimed to distribute over two trillion dollars in the form of \$1200 payments to any individual who qualified below a given income threshold. The program was a massive experiment for the US government and showed some major flaws in its application. In fact, more than thirty million eligible Americans never received the stimulus, mostly due to their lack of financial inclusion and a process for receiving the payments that was not user friendly. Others were either victims of fraud that deprived them of their funds or were reluctant to trust the debit cards that they received in the mail. An account-based CBDC could have solved all of these issues by simply allowing the central bank to increase the balances in the wallets of those who qualified, based on IRS records that could have been directly linked to the accounts themselves.

## **6. A US CBDC to Maintain the International Dominance of the US Dollar**

This section focuses on addressing changes in cross-border payments systems and how these might negatively affect the dominance of the US dollar. In the current environment, rising competition against SWIFT, on which the United States exercises a high level of influence, might lead the Federal Reserve to create an alternative cross-border payment system based on CBDC in order to facilitate payments and continue to enact foreign policy successfully.

### *6.a CBDC as an Alternative to SWIFT*

The US dollar represents the leading currency for international transactions because it represents an extremely reliable unit of account and medium of exchange, with many businesses in developing countries, and sometimes governments themselves, opting to borrow in foreign

currencies (mostly the US dollar) to gain investor confidence when the local currency is highly volatile.

The Federal Reserve states that in the period from 1990 to 2019, the US dollar accounted for over 74% of trade invoices in the Asia-Pacific region and about 79% in the rest of the world, with Europe representing the only exception (Bertaut). Additionally, the US dollar accounts for about 60% of foreign currency liabilities and claims, with all the major commodities prices and contracts being priced against the dollar.

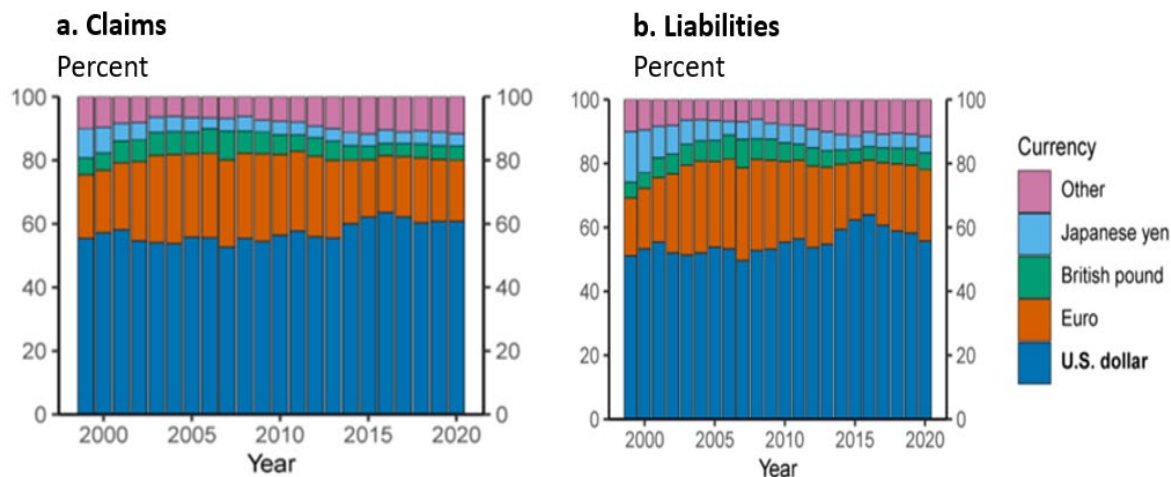


Fig. 5. % share of U.S for international claims and liabilities: a) Claims and b) Liabilities.

Source: FED.

While this heavy reliance on the US dollar has many benefits for the US economy, it can often come at the expenses of smaller emerging economies that can see capital outflows and inflows at the mercy of US monetary policy. The Federal Reserve operates, and holds a mandate, in respect to domestic policy and can operate in disregard to other smaller economies that might

rely to the currency, therefore allowing for a high level of influence on foreign countries and financial markets.

International payments are currently processed through the SWIFT system, which provides a secure and reliable way of transferring funds internationally between financial institutions. While SWIFT is officially neutral, the US holds considerable influence over its operations and has often used its power to deter countries or banks from using the system as a punitive method to enforce sanctions and promote its foreign policy. In particular, the US was one of the major advocates for the expulsion of Russian financial institutions and the Russian Central Bank from SWIFT after Russia's invasion of Ukraine, which has caused the ruble to devalue by over 40% and banks and firms to remain isolated from foreign markets. This has significant importance on the neutrality of SWIFT and raises questions about possible alternatives that are currently being developed, mostly by US-sanctioned countries such as Iran, Venezuela, and Russia, and the impact that the introduction of payment systems based on foreign CBDCs could have on the international monetary system. In order to protect domestic interests, China launched in 2015 the Cross-border Interbank Payment System (CIPS), which offers services analogous to SWIFT and settles transactions in Renminbi. CIPS is structured in a way that can be easily integrated with other payment systems and has adopted ISO 20022, a standard protocol for messages to be available in both English and Chinese. The system currently accepts payments from trusted foreign institutions including Deutsche Bank, JP Morgan, and Citibank, in addition to Chinese institutions and other foreign banks that are either affected by US sanctions or have a significant trade relationships with China (many African nations that are part of the Belt and Road initiative have joined the system). Trade on CIPS has steadily increased, with a total amount of around seven billion US dollars in transactions as of December 2020 (Prasad).

Concurrently, other European nations have created alternative instruments, such as INSTEX, to better trade with Iranian firms following the signing of the Iranian nuclear deal.

This increase in competition for SWIFT could represent an incentive for the US to develop an alternative system based on the dollar, and in particular a CBDC, to avoid losing dominance over the international payment markets and maintain a position of leverage to pursue foreign interests while maintaining efficiency. In fact, if the US were to create a digital dollar based on a distributed ledger that was able to successfully register international payments and securely settle and process them, it would gain a strong, stable alternative that, given the dollar dominance on foreign transactions, could cause the abandonment of SWIFT for the new CBDC-based system and increase foreign reliance on US monetary and foreign policy.

## **7. Other Benefits of CBDCs**

In addition to the aforementioned advantages involving the implementation of foreign and monetary policy, CBDCs could offer other important advantages for regulators to fight against the financing of illegal activities and offer a tool to fight the shadow economy and increase tax revenues.

### *7.a The Case for Non-Anonymity*

In recent decades, the fight against illegal activities, and in particular terrorism, has partially shifted in a war against money laundering by way of cutting off the resources needed by criminals to finance their wrongdoing. In this environment, cash has often represented the best nontraceable instrument that can also grant immediate settlement. A report published by Sweden's national bank showed that as cash in the economy has declined, so too have cash-related crimes, including bank robberies and taxi robberies. However, the report showed that at

the same time, between 2009 and 2019, cybercrimes increased by almost 300% (Sveriges Riksbank).

### *7.b CBDCs as a Tool Against the Shadow Economy*

The term *shadow economy* refers to the set of activities that fall outside government oversight, taxation, and clear observation. Based on an IMF report, Medina and Schneider showed that the size of these shadow markets can be relatively large, even for the developed economies of the OECD, and accounted for 17.5% and 15.6% of the GDP of Italy and the Slovak Republic, respectively. In the case of developing economies, these numbers can reach above half of GDP. Since it is very hard to estimate the extent of these activities by definition, studies have used different methods that vary from surveys to night lights as a proxy to estimate economic activity, as used by Henderson et al. Admitting for large variance in the results of these studies, the value of these transactions that escape taxation remains an important issue for regulators to tackle.

According to a paper published by the Bank of Korea in 2020, an interest-bearing CBDC could transfer seigniorage revenues from transaction which evade sales tax, conducted mainly by cash, to those who pay it, thus increasing consumption in taxed transactions (Bank of Korea). Since cash serves as the primary source of financing for these tax-evading activities, tackling down on cash and instead focusing on easily traceable CBDCs could provide a useful deterrent for economies that aim to increase their tax revenues without negatively affecting law-abiding citizens.

## **8. Disadvantages and Risks of Issuing a CBDC**

This section aims to identify some issues regarding the implementation of CBDCs. It focuses on the risks associated with financial disintermediation and increased lending costs for households and businesses as well as the risks of an easily accessible CBDC in regard to liquidity and bank runs and, ultimately, the privacy concerns that a CBDC might generate among the public.

### *8.a Financial Disintermediation*

As previously noted, a central bank could apply negative interest rates to CBDCs during times of economic turbulence or positive interest rates when inflation is rising and the economy is expanding. This could create an unstable environment that could push for the disintermediation of central banks and a decrease in the availability of capital for the private sector.

The introduction of a CBDC could induce customers to move their deposits from a private financial institution to the central bank. This reduction in deposits could push the former to rely on wholesale funding, which would in turn raise their funding costs and in return increase lending costs or cut their profitability, thereby affecting consumers in the first case and the stability of the banking system in the second. The extent to which funding costs will increase for financial institutions depends on the spread between the cost of deposit and the wholesale funding cost, which in the current low interest rate environment is around zero.

### *8.b Bank Runs and Flight Risk*

Even the existence of a nonpositive-interest-bearing CBDC would pose issues for the stability of a banking system, as the existence of a risk-free deposit account could be enough to foster bank runs during times of instability or even when there is simple misinformation about

the solvency or insolvency of a given institution. The easy digital accessibility that these instruments would be granted would make these runs almost instantaneous and hard to predict.

According to Diamond and Dybvig, deposit insurance can provide a useful and powerful tool for avoiding systemic bank runs; however, a CBDC-based deposit account could still be the safest option during a time of generalized panic. In particular, large depositors that exceed the FDIC insurance threshold of \$250,000 would see flight from financial institutions to a safe account at the central bank as the best option to avoid financial losses. Therefore, CBDCs could represent a tool to deprive financial institutions of important liquidity during the times they might need it the most.

### *8.c Privacy Issues*

Many arguments made against CBDCs involve the lack of privacy that they provide users in contrast to cash, which gives its users maximum anonymity during transactions. Both value-based and account-based CBDCs would act through a central ledger or register to manage and enable transactions, making every payment theoretically traceable. Since each transaction would involve a payer and a payee, both registered on such a ledger, the extent to which these transactions remain anonymous would depend on the protection granted by federal regulations in terms of the confidentiality of these accounts, just as in the case of credit cards and bank confidentiality.

In its report on the e-krona project, the Swedish central bank often stated that its CBDC would not allow for total anonymity by design (Sveriges Riksbank). A high level of trust in the national government prompted the adoption of the e-krona; however, the same might not apply

in other individualistic societies in which privacy might be valued more than ease of transaction and safety of deposits.

The graph below summarizes main advantages and disadvantages of issuing a US CBDC.

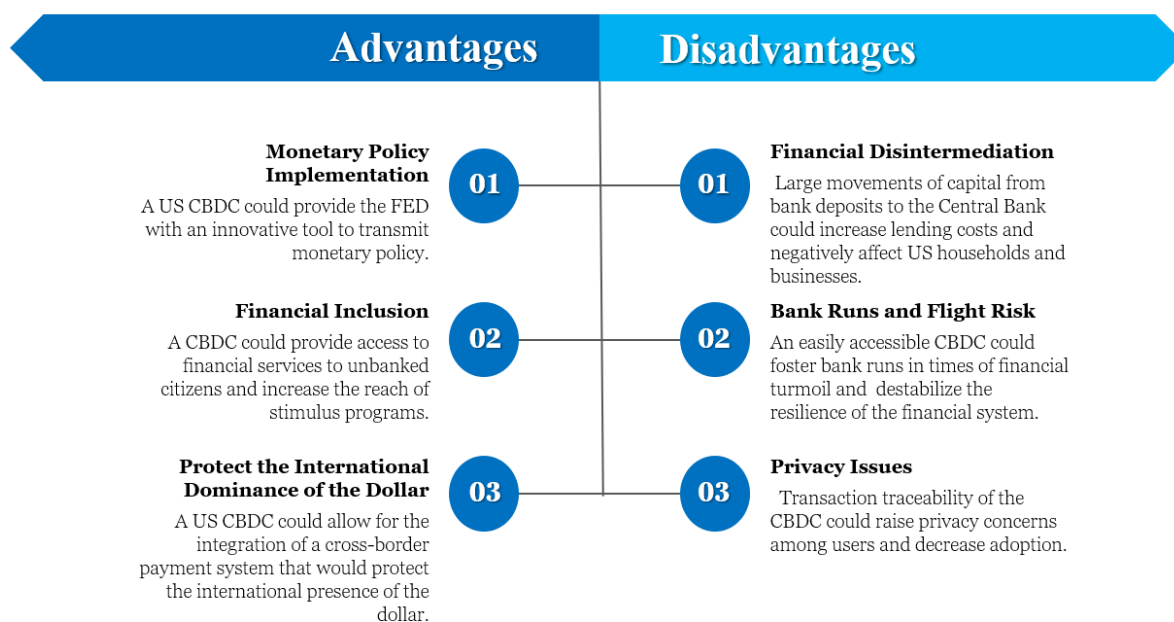


Fig. 6. Advantages and disadvantages of issuing a US CBDC.

## 9. Current Stance of the FED on the Issuance of a Digital Dollar

In January 2022, The Board of Governors of the Federal Reserve System published a report named “Money and Payments: The US Dollar in the Age of Digital Transformation” that aimed to define the potential benefits and risks of a US CBDC. The paper was structured in such



a way as to foster public discussion between relevant stakeholders, although it should not be intended as a sign of any imminent decision on the matter from the Federal Reserve.

The report argued that a CBDC could provide financial stability and liquidity in systemically important payment systems. In particular, the recent growth in deposits in nonbank payment services and the related increase in payment system integrity and financial stability could result in a lack of protection for consumers in contrast to protections that are associated with commercial banking, thereby increasing the need for a centrally backed digital currency that could offer protection and stability to consumers.

A US CBDC could also provide a useful tool for increasing the financial inclusion and reach of the 5% of the US population that remains unbanked and another 20% that still relies on expensive financial services such as payday loans and money orders. The Federal Reserve does not exclude the possibility of creating a CBDC that could be used for cross-border payments that remain slow, not easily accessible, or associated with generally high costs. A reduction in these costs and the associated complications given by the infrastructure supporting these transactions could generate economic growth both for households that rely on remittance transactions and for small business that do not frequently interact with global suppliers and are not able to negotiate long-term contracts to manage exchange rate risk and the associated fees.

The increase in digital assets that try to emulate currencies, such as cryptocurrencies and stablecoins, can negatively affect consumers who decide to invest in such assets, which are susceptible to high volatility and vulnerable to theft and fraud. Moreover, the Federal Reserve acknowledges that while well-designed and regulated stablecoins could foster economic support for faster and more efficient payment systems, an increase in their use could potentially destabilize the payment system, induce runs, and concentrate economic power in the hands of a

few selected players. For these reasons, the President's Working Group on Financial Markets issued a highly detailed report recommending that Congress quickly enacts legislation in order to develop a regulatory framework to regulate payment stablecoins and their transactions.

### *9.a Design Structure*

A possible FED-backed CBDC would represent the safest digital asset available to the public, with no associated credit or digital risk. (Federal Reserve) The currency would have to reach a perfect balance between respecting the privacy rights of consumers and deterring illicit activity. The committee recommends the introduction of an intermediated CBDC with commercial banks and nonbanks acting as service providers. This design structure would allow for a reduction in the risk of disintermediation for the financial system and could leverage existing privacy and identity-protection frameworks, as well as the private sector's ability to rapidly innovate. The currency would have to be identity-verified and easily transferrable for it to become both an efficient means of payment and a robust tool to combat money laundering and the financing of terrorism (Federal Reserve).

With regard to international implications for the issuance of a US CBDC, the working group argued that a new digital currency could help preserve the international dominance of the US dollar while granting a reduction in transaction and borrowing costs for US households, businesses, and government and influencing standards for the international monetary system. In particular, the committee cited possible widespread adoption of foreign CBDCs as a risk for de-dollarization across the globe, if these new currencies were to become more attractive than the existing forms of the US dollar.

The report raised concerns about the issuance of an interest-bearing CBDC, as this would provide an almost perfect substitute to commercial bank money and could therefore decrease deposits and credit availability while raising bank funding and credit costs for US consumers and businesses. Moreover, an interest-bearing CBDC could shift money away from low-risk assets such as mutual funds and US treasuries, thereby increasing funding costs for businesses and the government. The report argued that a noninterest-bearing CBDC could mitigate most of these issues while providing a better, safer alternative to nonbank money, including cryptocurrencies and stablecoins.

#### *9.b CBDCs and Monetary Policy Implementation*

The report acknowledged the importance of correctly designing a CBDC so that it could affect monetary policy implementation. Currently, the Federal Reserve operates under an “ample reserves” monetary regime, in which the level of federal funds, rate, and other short-term interest rates are controlled through the Federal Reserve’s administered rates. The introduction of a noninterest-bearing CBDC would have a minimal impact on the level of reserves and the federal funds rate, given an initial level of reserves large enough to provide a buffer in case of an increase or decrease in demand for currency. In case of the growth of the digital currency being large, the FED would have to expand its balance sheet, as in the case for a balance-sheet increase in physical currency (Federal Reserve).

In the case of an interest-bearing CBDC, the implications for the implementation of monetary policy would be more pronounced because households and businesses could decide to move holdings in other safe assets to the new currency and potentially force the Federal Reserve to expand its holding of securities. Additionally, foreign demand for the currency could further complicate monetary policy implementation. The report suggested that studies are being

conducted on the possible benefits of the introduction of an interest-bearing CBDC as a new policy tool to achieve macroeconomic objectives, and it will further elaborate on these concepts once research becomes clearer (Federal Reserve).

### *9.c Operational Resilience and Cybersecurity*

Existing private payment systems are susceptible to operational and cybersecurity risks that can put consumers at risk of data theft and fraud. Infrastructure aimed at supporting a new CBDC would have to be extremely resilient and more sophisticated in order to protect the interests of US households and businesses when they use the currency. Additionally, the Federal Reserve is currently considering the feasibility of offline payments based on a CBDC in order to provide access to financial services in case of large disruptions to internet services, such as those caused by natural disasters.

### *9.d Future Outlook*

The Federal Reserve is currently engaged in several research projects to evaluate the feasibility of issuing a digital dollar and focusing in particular on the issues of financial inclusion and stability. It aims to collaborate with other relevant central banks to better determine the feasibility of cross-border payments based on the new currency and is promoting conversations with meaningful stakeholders to determine further steps. Digital dollars are not yet being tested in any pilot program but will continue to be the subject of research for an undetermined amount of time (Federal Reserve).

## **10. Conclusion**

While the introduction of a digital dollar could democratize the financial system by offering new paths to central banks to increase financial inclusivity, anti-money-laundering solutions, and

faster and more efficient tools to implement stimulus programs, the design that will be attributed to these new instruments will determine their impact on monetary policy and their adoption by US businesses and households. A poorly designed CBDC would pose many dangers to the stability of the financial system, as an interest-bearing digital dollar would promote disintermediation of financial intermediaries, excessive foreign demand for the digital currency with negative implications both domestically and abroad, and the destabilization of the banking system during liquidity shocks. The importance of the design that central banks will choose and the role played by regulators will be essential for the future development of the financial system. The graph below shows a possible design structure for a U.S CBDC.

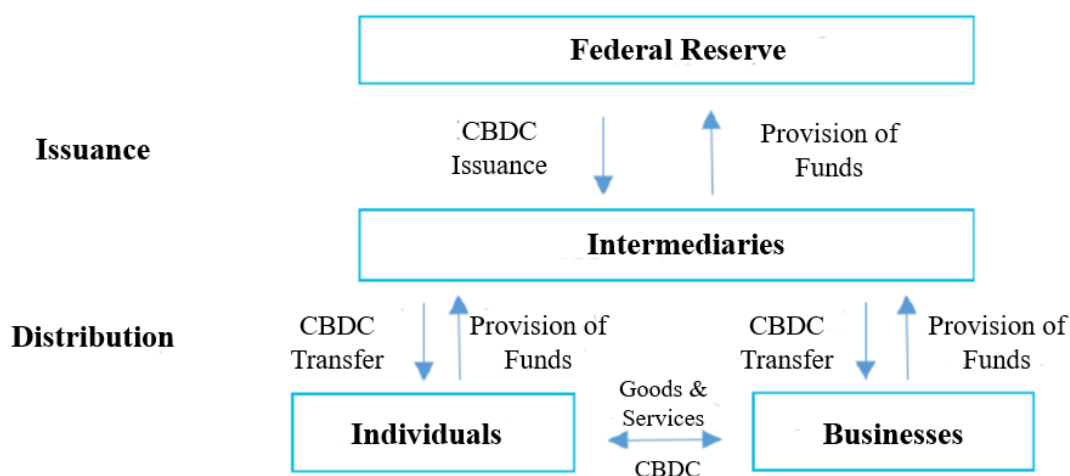


Fig. 7. Overview of the suggested issuance and distribution of a US CBDC.

An intermediated CBDC, issued by the central bank but distributed by accredited financial institutions, could mitigate the aforementioned negative effects, fostering growth in innovation for payment systems and, most importantly, promoting private innovation to bring a new instrument that offers financial services to segments of the population that are still partially

excluded from economic life in the country. In this system, businesses and individuals will be able to exchange goods and services using the CBDC and avoiding the reliance on private payments systems.

Additionally, the FED should consider issuing a non-interest bearing CBDC to avoid large shifts from safe assets into the digital currency while maintaining the optionality of changing this design structure in times of economic turmoil, providing a new innovative tool for the implementation of monetary policy. Lastly, the FED could adopt a structure similar to the Sand Dollar and the e-CNY in which the amount of currency is capped for account holders in order to avoid large outflows from bank deposits and for better management of the initial infrastructure on which the currency will run.

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